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*Literature Review on the Welfare Implications of*  
***Tail Docking of Cattle***

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### **THE ISSUE**

Tail docking is a management practice used within both the dairy and beef industries. The dairy industry in New Zealand developed the process during the early 1900s as an attempt to reduce the incidence of leptospirosis in milking personnel. The stated goals of tail docking in dairy cows include improved comfort for milking personnel, enhanced udder cleanliness, reduced incidence of mastitis, and improved milk quality and milk hygiene. For beef cattle, tail docking is used in confined slatted floor feedlot operations; these facilities are mainly located in the Great Lakes region of the United States and Ontario Canada within North America. Stated goals are to reduce injury associated with tails being stepped on by other cattle and/or caught in between the slats of slatted floors, and to prevent subsequent tail infection, ascending myelitis, septicemia, and lameness resulting from these injuries.

A variety of methods have been used to dock tails in dairy cattle, including cauterizing docking irons, application of elastrator bands, use of emasculators, and surgical excision. The application of elastrator bands is the most commonly employed method. Tail docking in the dairy industry is usually performed on preparturient heifers or calves near weaning age. An elastrator band or tight rubber ring is applied to the tail so that between 1/3 and 2/3 of the tail are removed; in New Zealand, regulations determine the minimum length between the distal vulva and the site of band application.<sup>1</sup> Placement distal to the sixth coccygeal vertebra has been recommended to ease the docking process and to avoid leaving a tail that is too short for proper restraint or that parts the vulvar lips and allows manure contamination of the urogenital tract.<sup>2</sup> The necrotic distal portion of the tail detaches 3 to 7 weeks after banding, or may be removed by using clean shears. Tail docking in the beef industry at the feedlot requires that the distal 2/3 of the tail be removed immediately after placement of the elastrator band or rubber ring.

### **TAIL DOCKING IN THE UNITED STATES AND OTHER COUNTRIES**

Tail docking is no longer a common procedure in dairies in New Zealand, and the practice appears to be declining in other countries including the United States, although it remains common in some geographic regions. Denmark, Germany, Scotland, Sweden, the United Kingdom, and some Australian states prohibit tail docking. In Australian states where the practice is permitted, guidelines state it should be performed when recommended by a veterinarian for health reasons, and the tail stump must be long enough to cover the vulva.<sup>2</sup> In Canada, national guidelines recommend that the procedure be performed on young calves by trained personnel with the proper equipment and attention to pain relief.<sup>2</sup> The Canadian Veterinary Medical Association opposes the practice of docking of dairy cattle for management purposes.<sup>3</sup>

In the United States, California has passed legislation banning routine tail docking in dairy cattle and similar actions have been proposed in other states. A survey of 113 North Central and North Eastern U.S. dairies<sup>4</sup> found that tail docking was practiced on 82.3% of the dairies. The most common reported

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docking time in dairy cattle was before or shortly after calving (35.2%). Rubber band was the most common method (92.5%) in dairies. Cow hygiene was suggested as the most common reason to dock (73.5%) dairy cows followed by worker comfort at 17.4%.

Current AVMA policy opposes routine tail docking of cattle. The current position of the American Association of Bovine Practitioners (AABP) states that *“The AABP opposes the routine tail docking of cattle. Current scientific literature indicates that routine tail docking provides no benefit to the animal.”*<sup>5</sup>

### **SCIENTIFIC EVIDENCE ON THE BENEFITS OF TAIL DOCKING**

***Reduced risk of leptospirosis in milkers***—Urine from infected animals is the primary source of transmission of leptospirosis. Infection can occur via contact with skin abrasions or wounds, or via contact with the mucous membranes of the eyes, nose, and mouth.<sup>6</sup> Docking is thought to reduce the risk of leptospirosis by eliminating the possibility that a urine-soaked tail could contact the milker’s skin or face. Mackintosh et al<sup>7</sup> determined that the leptospiral titers of milkers bore no relationship to tail docking, and hypothesized that transmission of leptospirosis in endemic herds likely occurs from sources other than tail contact.

***Improved cow and udder cleanliness***—Anecdotal support for tail docking centers on the idea that a soiled tail can inoculate the udder with pathogens. One study revealed that rear-quarter cleanliness was greater for docked cows compared with intact cows; however, no statistical differences were observed with respect to udder cleanliness or somatic cell count (SCC).<sup>8</sup> In another study, cow cleanliness, udder cleanliness, and SCC scores were not different for docked heifers compared with intact heifers.<sup>9</sup>

***Reduced incidence of mastitis and improved milk hygiene***—Environmental pathogens present in dirt, manure, and water can cause mastitis in dairy cattle. Tail docking is reported to decrease the incidence of mastitis caused by environmental pathogens by eliminating the possibility that a heavily soiled tail or tail switch would come in contact with the udder. A review of the related scientific literature reveals leg cleanliness scores were improved in docked cattle compared with intact cattle. No significant differences were observed in SCC, udder cleanliness, or intramammary infection between docked and intact cattle.<sup>10</sup> Although docked cattle had a higher incidence of mastitis in one study,<sup>9</sup> the difference was not statistically significant.

***Reduced incidence tail injury and improved performance***—Trampling by pen mates appears to be the major cause of tail damage in indoor beef feedlots. The tail tip of the lying animal lies on the floor away from the animal’s body and is unprotected against trampling. A tail that is lying on a hard, inflexible sharp-edged surface (e.g., a slatted floor) is more likely to incur severe damage from trampling than a tail that is on a soft, flexible surface. In general, slatted floor facilities have higher stocking densities than those with solid floors, and slatted facilities with the highest stocking densities had the highest prevalence of tail tip necrosis.<sup>11,12</sup>

Tail tip necrosis can lead to tail infection, ascending myelitis, septicemia, and lameness in cattle that have suffered a tail injury however the risk of subsequent infection from tail injury is low. A study on the prevalence of tail tip necrosis in Ontario Canada found 34.5% of tails inspected at slaughter plants to have necrosis with only 3.4% having infections.<sup>13</sup> Another study conducted in Ontario found that cattle housed in solid floor facilities had no tail tip necrosis, whereas 1.36% of cattle housed in slatted floor facilities were treated or slaughtered for tail tip necrosis.<sup>11</sup> A similar study in Nebraska found 1% of cattle housed in a slatted floor facility to have tail tip necrosis.<sup>14</sup> Tail tip lesions occur most often in cattle without docked tails housed on slats, followed by cattle with docked tails housed on slats.<sup>12</sup> The lowest prevalence of tail tip lesions is in cattle housed in solid bedded facilities.<sup>11</sup> Severe tail tip lesions occur the most in cattle that are not tail docked and are housed on slatted floors.<sup>11</sup> Severe lesions also

occur in docked cattle housed on slats however no severe lesions were found on cattle housed in solid bedded facilities.<sup>11</sup> Finally, two studies identified no differences in performance or health indices between cattle with docked tails and cattle without docked tails housed on slats.<sup>15,16</sup>

### **WELFARE CONCERNS—THE SCIENCE, RISKS, SEVERITY, AND ADVANTAGES**

**Acute pain**—Application of a tight band around the tail produces extraluminal compression of the arteries and veins, resulting in impeded arterial flow and venous drainage in the tissues. Lack of perfusion compromises the supply of oxygen and metabolic substrates to the tissues and results in ischemia. Continued ischemia induces severe cellular damage and coagulation necrosis.<sup>17,18</sup> Ischemic lesions of the intestinal tract or limbs are known to cause pain during the acute phase, followed by decreased pain as the lesion progresses. The greatest challenge for determining the severity of pain associated with tail docking in cattle lies in an accurate assessment of signs of pain in this species.

Three-week-old Holstein calves have been observed to exhibit increased walking or running behavior, increased head-to-tail movement and licking, and less tail swinging and lying behavior following application of a rubber ring for tail docking. These actions have been interpreted as indicators of mild distress. Distal tail sensitivity to hot water was absent 75 to 105 minutes after banding, indicating desensitization of the tail below the banding site.<sup>19</sup>

When compared with 7- to 21-day-old calves, banded 22- to 42-day-old calves exhibited significantly more rear visualization and restlessness than intact calves of the same age.<sup>20</sup> That study's investigators concluded that, although age-related behavioral differences were observed, tail docking of calves produced a minor response.

Based on measurement of plasma cortisol concentrations of calves before and after tail docking with a rubber ring or cautery iron, Petrie et al<sup>21</sup> determined that docking did not result in significantly more distress than restraint and blood sampling. A small number of 3- to 4-month-old calves exhibited tail shaking and vocalization, which was interpreted as discomfort. The use of local anesthetic at the time of ring application provided no detectable benefit in reducing physiologic signs of stress.

Tail docking of adult heifers using an elastrator band with or without local anesthesia resulted in few physiologic or behavioral effects. Banded heifers spent more time eating during the week following banding, which may have represented displacement behavior and mild distress; these behaviors returned to pre-banding levels when necrotic tails were removed. Increases in plasma cortisol concentrations, considered indicators of stress, were not observed.<sup>22</sup> Restlessness was observed during the first hour after banding in preparturient heifers, but the finding was not statistically significant.<sup>10</sup>

Docked heifers spent significantly less time holding their tails in the raised position following docking and significantly more time with their tails in the pressed position, but no differences were observed in feed intake or milk production. Holding the tail in the pressed position was interpreted as an indicator of discomfort. Significantly less tail shaking was observed in docked heifers, and was hypothesized to be related to pain associated with shaking the recently banded tail. No differences were observed in behavior of heifers docked with or without epidural anesthesia. The investigators involved in that study concluded that tail docking was associated with minimal discomfort in heifers, and that use of epidural anesthesia provided no benefit.<sup>23</sup>

**Chronic pain**—Following trauma to peripheral nerves (including that induced by banding and docking), continued growth of damaged nerve axons may result in the formation of a mass of tangled axons called a neuroma.<sup>24</sup> Neuromas are associated with chronic pain, and may play a role in post-amputation pain in humans.<sup>2</sup> Neuromas have been reported to develop after beak trimming in poultry

and tail docking in pigs,<sup>25,26</sup> and were observed at slaughter in tail stumps of adult cattle that had been docked using a knife at 12 to 18 months of age.<sup>27</sup> Eicher et al<sup>28</sup> documented increased sensitivity to heat or cold in previously docked heifers. These findings were comparable to those observed in humans experiencing phantom limb pain following amputation, and were interpreted as indicators of chronic pain. In addition, neuromas were identified in the tail stumps of the docked heifers included in the study.

**Physiologic stress**—Blood cortisol concentrations have been studied as indicators of physiologic stress in animals. Tail docking of preparturient Holstein heifers did not result in significant alterations in cortisol concentrations.<sup>8,20,22</sup> Docking of three-week-old calves did not significantly increase blood cortisol concentrations above those associated with handling and sample collection.<sup>21</sup>

**Disease**—Necrotic tissue, such as the ischemic distal tail after banding, is prone to infection with pathogens. Clostridial organisms, ubiquitous in soil, may colonize the wound and result in local or systemic infection. Tetanus and gangrene have been reported after tail docking, and vaccination against clostridia is recommended prior to performing the procedure.<sup>2</sup>

**Behavior**—The role of the tail in communication between cattle has not been documented, but it has been speculated that tail docking limits the ability of cattle to exhibit normal signaling behavior.<sup>29,30</sup> In addition, the tail is widely believed to play a role in fly control; shaking the tail and brushing the body and limbs can dislodge biting flies. Fly avoidance behaviors following tail docking have received attention from researchers for their implications for animal welfare. The stable fly (*Stomoxys calcitrans*) is a common disruptive fly, and its presence has been associated with increased stress, reduced milk production and weight gain, disrupted grazing, and reduced growth.<sup>31</sup> Observed fly avoidance behaviors include stomping, kicking the trunk, tail swishing, skin twitching (panniculus reflex), head and ear motion, and taking flight.<sup>8,19</sup>

Fly counts have been observed to be greater on the rear limbs of docked three-week-old calves during times of high fly activity.<sup>19</sup> Several studies have confirmed that although front limb fly avoidance behaviors did not differ, rear limb fly avoidance behaviors were significantly increased in docked cows when compared with intact cows.<sup>8,32,33,34</sup> In addition, almost twice as many flies were observed on the rear limbs of docked cows compared with control cows.<sup>7</sup>

## SUMMARY

Anecdotal reports of the benefits of tail docking are not currently supported by data in the scientific literature. Tail injury from trampling can be minimized by maintaining a lower stocking density and providing solid flooring and/or bedding for cattle. Tail docking has been experimentally shown to cause minimal adverse physiologic effects; however, fly avoidance behaviors are more frequent in docked cattle, suggesting potential long-term adverse behavioral effects. Increased temperature sensitivity and the presence of neuromas suggest that chronic pain may be associated with the procedure.

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